REMARKS

This application has been carefully reviewed in light of the Office Action dated November 5, 2002. Applicants have amended claims 1, 9, 16 and 26. Reconsideration and favorable action in this case are respectfully requested.

The Examiner has rejected claims 1-2, 5-9, 12-16 and 19-32 under 35 U.S.C. §112, first paragraph, under the reasoning that claims contain subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The examiner states that the inclusion of the limitation of "an explosive reaction" between the hydrogen containing gas and the oxygen containing gas is not enabled by the application's specification. Further, the Examiner states that the limitation of introducing O_2 and H_2 in an explosive reaction to the insulating layer, silicon-containing structure and conductive structure is not enabled, since the O_2 and H_2 are introduced to the chamber rather than the insulating layer, silicon-containing structure and conductive structure.

The Examiner has rejected claims 1-2, 5-9, 12-15, 20-23 and 27-28 under 35 U.S.C. §102(e) as being unpatentable over U.S. Pat. No. 6,197,702 to Tanabe et al (hereinafter "Tanabe"). Applicants have reviewed this reference in detail and does not believe that it discloses or makes obvious the invention as claimed.

The Examiner has rejected claims 29, 30 and 32 under 35 U.S.C. §103 as being unpatentable over Tanabe. Applicants do not believe that this reference discloses or makes obvious the invention as claimed.

The Examiner has also rejected claims 16, 19, 24-25 and 31 under 35 U.S.C. §103(a) as being unpatentable over U.S. Pat. 5,814,526 to Tseng, in view of Tanabe.

With regard to the §112 rejections, Applicants have previously provided evidence that the present specification discloses an explosive reaction between the hydrogen

containing gas and the oxygen containing gas. In the Amendment of February 4, 2002, Applicants stated (with reference to U.S. Pat. No. 5,907,188 to Nakajima et al, cited by the Examiner):

> The specification discusses a reaction between O_2 and H_2 (as well as other embodiments of oxygen-containing gases and hydrogen-containing gases) to produce the selective oxidizing. A reaction between O_2 and H_2 is explosive if the partial pressure is above the explosion limit (the Nakajima reference states that the explosion limit is at a partial pressure of about 4%). Applicant has provided many examples in the specification where one of the gases is set at a partial pressure above the explosion limit. On page 7, a constant volume mix of O_2 and H_2 in a ratio of 1:10 are reacted at an initial pressure of 200 Torr. On page 8 (last paragraph), 12% O_2 and H_2 are introduced into the chamber. On page 11, an O_2/H_2 mixture of 20% is described. All of these reactions are above the explosion limit set by the Examiner's reference (see Nakajima, col.6, lines 24-55).
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> Despite the explosive reaction, the pressure can be maintained at safe levels using techniques described on page 7, such as by starting at a low chamber pressure, reacting the H_2 and O_2 as the gases enter the chamber, or by starting at a low concentration of one gas and increasing the concentration once the reaction starts, such that the change in pressure is not as dramatic.
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> Accordingly, the Applicant has provided several examples of gases that have an explosive reaction in the specification. Hence, the terminology used in the claims is fully supported by the specification. Applicant therefore respectfully requests that the rejection under 35 U.S.C. §112 be withdrawn.

Further, in the Response filed July 25, 2002, the Applicants filed a Declaration stating that the processing parameters specified in the present application described an explosive reaction.

Applicants believe that the evidence provided to the Examiner is both credible and sufficient to support the disclosure of a reaction in the specification that would be clearly be an explosive reaction to anyone skilled in the art. The explosive limit of a partial pressure of 4% is well known in the art, as evidenced by the reference in Nakajima. Anyone skilled in the art would know that conditions described in the present specification are well above the explosion limit. Further, the specification specifically describes techniques to avoid harmful consequences of the reaction, which would be unnecessary in the absence of an explosive reaction. If the Examiner disagrees, Applicants respectfully request that the Examiner provide specific reasons why the evidence is either not credible or not sufficient, so that the problem can be corrected.

With regard to the §102 and §103 rejections of the claims in view of Tanabe or Tseng and Tanabe, Applicants note that Tanabe does not show an explosive reaction in *the processing chamber*, as required by the present claims. In Tanabe, a water vapor/hydrogen mixed gas (H_2 and H_2O) enters the processing chamber. The H_2 and H_2O are not capable of an explosive reaction in the processing chamber. The water vapor/hydrogen mixed gas is produced by reacting H_2 and O_2 in a catalytic converter 141 *external to the processing chamber* 101 (col. 14, line 66 through col. 15, line 12). There is thus no reaction which occurs in the *processing chamber* 101, as required by the claims. Furthermore, a catalytic conversion will not involve an explosive reaction.

The present application teaches a process which explosively reacts hydrogen and oxygen *in the processing chamber*, but doing so in a way that the pressure remains at a safe level (as described in detail on page 6, line 18 through page 7, line 16). This provides higher concentrations of H_2 and O_2 for the oxidation and may be used to eliminate the need for an additional inert gas in the chamber. Tanabe does not show any process that introduces hydrogen and oxygen into the processing chamber, nor does Tanabe show an explosive reaction in any chamber. The process shown in Tanabe

requires an additional catalytic converter, which makes the processing more expensive and more complicated relative to the present invention.

Accordingly, Applicants respectfully request allowance of independent claims 1, 9, and 26, and dependent claims 2, 5-8, and 12-15.

Dependent claims 20-25, and 27-32 provide three different ways in which the explosive reaction of the gases in the processing chamber can be maintained at safe levels. These claims are directed to reducing drastic changes in pressure and provide a significant benefit.

Dependent claims 20, 22, 24 and 27 describe a specific method for maintaining pressure below a predetermined level. Namely, the O_2 (or oxygen containing gas) and H_2 (or hydrogen containing gas) are introduced in a portion of a process chamber's total volume, such that the reaction between O_2 and H_2 occurs continuously as the O_2 and H_2 enter the chamber (as opposed to fully introducing the gases to the chamber prior to igniting the gases). Thus, the reaction is confined to a portion of the chamber where the gases react continuously as they enter the chamber. This leaves the rest of the chamber available for expansion, increasing the safety of the process and enlarging the process window.

The text cited by the Examiner (Tanabe, col. 14, lines 56-65) refers to H_2 and O_2 entering the catalytic converter (reactor) 141, not the *processing chamber* 101. Since the catalytic conversion does not entail an explosive reaction, Tanabe does not describe an explosive reaction in a portion of the catalytic converter 141.

Accordingly, Applicants respectfully request allowance of claims 20, 22, 24 and 27.

Claims 21, 23, 25 and 28 describe an additional method of maintaining the pressure of the chamber below a predetermined level. In this case, the O_2 (or oxygen

containing gas) and H_2 (or hydrogen containing gas) are introduced in a predetermined ratio, and the concentration of one of the gases is increased after the reaction begins. This technique can be used to minimize the shock of the reaction to the chamber.

The Examiner states that Tanabe (col. 14, lines 56-65) shows the introduction of O_2 and H_2 in a predetermined ration using mass flow controllers for opening or closing the passage of gases, which can be controlled precisely.

However, the O_2 and H_2 gases in Tanabe are not introduced into the *processing chamber*, as required by the claims. Further, Tanabe does not involve an explosive reaction, in the catalytic converter or the processing chamber; therefore, there is no teaching of increasing the concentration of one of the gases to control the explosive reaction. The only mention of controlling the concentration of the gases is to control the water vapor/hydrogen ratio (col. 15, lines 13-32). This would not teach one skilled in the art that a safe reaction could occur by adjusting relative gas concentrations during reaction.

Accordingly, Applicants respectfully request allowance of claims 21, 23, 25 and 28.

Claims 29-32 describe another alternative method of maintaining the pressure of the chamber below a predetermined level. In this case, the O_2 (or oxygen containing gas) and H_2 (or hydrogen containing gas) are introduced while the chamber is at a low pressure and the pressure is allowed to increase once the reaction begins. This technique can also be used to minimize the shock of the reaction to the chamber.

The Examiner states that it would be within the scope of one of ordinary skill in the art to vary the concentration of one of the reactants after the introduction into the chamber of the gases and the reaction.

First, the Examiner has not shown a reaction between O_2 (or oxygen containing gas) and H_2 (or hydrogen containing gas) in the *processing chamber*; Tanabe only shows reaction of these gases in a catalytic converter, as described above. Second, even within the catalytic converter, Tanabe does not discuss initially reacting the gases at a low pressure and subsequently allow the pressure to increase, since the reaction in the Tanabe catalytic converter is not explosive.

Accordingly, Applicants request allowance of claims 29-32.

Independent claim 16 and dependent claims 19, 24-25 and 31 are rejected under 35 U.S.C. §103(a) as unpatentable over Tseng and Tanabe. For reasons stated above, Tanabe does not show the use of an explosive reaction while maintaining a safe pressure level in the *processing chamber* or any of the specific embodiments for maintaining a safe pressure level in the processing chamber. The Examiner states that Tseng does not show the step of subjecting the bottom electrode and the dielectric to O_2 and H_2. Accordingly, Applicants request allowance of claims 16, 19, 24-25 and 31.

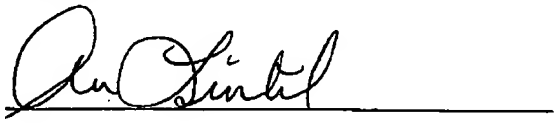
An extension of one month is requested and a Request for Extension of Time under § 1.136 with the appropriate fee is attached hereto.

The Commissioner is hereby authorized to charge any fees or credit any overpayment, including extension fees, to Deposit Account No. 20-0668 of Texas Instruments Incorporated.

Applicants have made a diligent effort to place the claims in condition for allowance. However, should there remain unresolved issues that require adverse action, it is respectfully requested that the Examiner telephone Alan W. Lintel, Applicants' Attorney at (972) 664-9595 so that such issues may be resolved as expeditiously as possible.

For these reasons, and in view of the above amendments, this application is now considered to be in condition for allowance and such action is earnestly solicited.

Respectfully Submitted,



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Version with marking to show changes made:

1 (Five Times Amended). A method of fabricating, in a semiconductor processing chamber, an electrical device formed in a semiconductor substrate, said method comprising:

forming an insulating layer over said semiconductor substrate;

forming a silicon-containing structure on said insulating layer;

forming a conductive structure on said silicon-containing structure; and

oxidizing a portion of said insulating layer and said silicon-containing structure while leaving said conductive structure substantially unoxidized by introducing O_2 and H_2 in the semiconductor processing chamber in an explosive reaction [to said insulating layer, said silicon-containing structure and said conductive structure], such that the reaction between said O_2 and H_2 does not increase the pressure in the processing chamber beyond a predetermined safe level.

9 (Five Times Amended). A method of oxidizing, in a semiconductor processing chamber, a first feature while leaving a second feature substantially unoxidized, said method comprised of subjecting said first and second features to O_2 and H_2 in an explosive reaction in said semiconductor processing chamber, such that the reaction between said O_2 and H_2 does not increase the pressure in the processing chamber beyond a predetermined safe level.

16 (Five Times Amended). A method of fabricating, in a semiconductor processing chamber, a capacitor having a dielectric between a bottom electrode and a top electrode and situated over a semiconductor substrate, said method comprising the steps of:

providing said bottom electrode over said semiconductor substrate;

providing a dielectric material over said bottom electrode; and

subjecting said bottom electrode and said dielectric material to an explosive reaction between O_2 and H_2 in semiconductor processing chamber [an explosive

reaction], wherein said dielectric material is oxidized and said bottom electrode remains substantially unoxidized, such that the reaction between said O_2 and H_2 does not increase the pressure in the processing chamber beyond a predetermined safe level.

26 (Four Times Amended). A method of fabricating an electrical device formed in a semiconductor substrate, said method comprising:

forming an insulating layer over said semiconductor substrate;

forming a silicon-containing structure on said insulating layer;

forming a conductive structure on said silicon-containing structure; and

oxidizing a portion of said insulating layer and said silicon-containing structure while leaving said conductive structure substantially unoxidized by introducing an oxygen-containing gas selected from the group consisting of O_2, N_2O, NO or CO_2 and a separate hydrogen-containing gas <u>in a semiconductor processing chamber</u> housing [to] said insulating layer, said silicon-containing structure and said conductive structure, such that an explosive reaction between said the hydrogen-containing gas and the oxygen containing gas does not increase the pressure in the processing chamber beyond a predetermined safe level.